

**NUTRITIONAL STATUS OF  
TRIBAL PRESCHOOL  
CHILDREN IN THREE  
ECOLOGICAL ZONES OF  
MADHYA PRADESH**

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**ABSTRACT**

*A health and nutrition survey was conducted on tribals in three ecological zones of Madhya Pradesh namely Jhabua (West Zone), Bastar (South Zone) and Sarguja (East Zone) taking into consideration the relative contribution of agriculture, forest and a combination of both to the economy, respectively. The consumption of both foods and nutrients appear to be worse among preschool children of Jhabua compared to Bastar and Sarguja. Clinically overt forms of Protein Energy Malnutrition and other vitamin deficiency signs were strikingly low. However, 4% of children in Sarguja exhibited signs of goitre. Both by extent and severity of malnutrition, the children of Jhabua appear to be worse followed by Bastar and Sarguja.*

**Keywords:** Ecology, Tribe, Economy, Preschool children, Dietary intake, Nutritional status.

India is the home of different tribal groups reflecting its great ethnic diversity. They constitute about 8% of the country's population(1). Their concentration is mainly in the central region comprising the states of Madhya Pradesh, Orissa, Maharashtra and Andhra Pradesh. Studies have shown that tribals living in different ecosystems have varying degrees of nutrition and health status(2-4). Because of their dependence on primitive agricultural practices, they often face uncertainty of food supply and thus tend to suffer from under-nutrition. In addition lack of proper health and educational facilities, and prevalence of certain irrational belief systems, in respect of health and nutrition aggravate the situation. It is believed that the nutritional situation among tribals is worse than the non-tribal rural population. In order to assess correctness of the general belief, a comprehensive study was undertaken in Madhya Pradesh, which is a major tribal populous State in India.

**Material and Methods**

Multi stage stratified random sampling procedure was adopted in selection of districts and blocks taking into consideration the relative contribution of agriculture, forest and a combination of both to the economy. Selection of villages was done

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according to the availability of health facility.

Thus, three districts namely, Jhabua (with agriculture economy), Bastar (with forest economy) and Sarguja (where both agriculture and forest contribute to the economy) were selected. In each district, two blocks were selected (on the basis of percentage of area under agriculture and forest) and in each block a cluster of villages was taken to cover 600 households. The following information was collected:

- (a) Food consumption through diet surveys
- (b) Growth status through anthropometry
- (c) Clinical examination for nutrition deficiency signs

A total of 1,401 preschool children from Sarguja (n=351), Bastar (n=731) and Jhabua (n=319) were covered for nutritional anthropometry. All the children were also examined for clinical signs of nutritional deficiency. Age assessment was done using the local events calendar(5). The food intake was assessed on a subsample of households by 24 hour recall method of diet survey.

Quantification of growth of children in terms of per cent deficit from standard measurement was done by using methods suggested by Gomez(6) and Waterlow(7). The 50th percentile values of height and weights of American children (NCHS) were used as standards(8). Chi-square test was used to find the level of significance in grades of malnutrition between the areas. Results of clinical examination were expressed as per cent prevalence of different nutritional deficiency signs.

After obtaining the quantity of different

raw foods consumed by the individuals, the nutrient intakes were calculated using Food Composition Tables from Nutritive Value of Indian Foods(9). The food and nutrient intakes were thus compared with RDA(10) to know the inadequacy in diet.

## Results

### *Food and Nutrient Intake*

Rice formed the staple grain in Sarguja and Bastar while the millets maize and jowar formed the staple in Jhabua. In addition varying amount of pulses, leafy vegetables, roots and tubers, vegetables and wild fruits were consumed. It is important to note that the milk intake was negligible in all the three areas.

The intake of cereals was higher in Bastar (210 g) than Sarguja (193 g) in 1-3 year age group while it was reverse in 4-6 year age group. The intake of staple foods (cereals and millets) was higher than the recommended dietary allowances of ICMR, in both Sarguja and Bastar but it fell short in Jhabua district among children of both age groups. The overall intake of pulse was closer to recommended level (35 g) in Sarguja (31 g) compared to those observed in Bastar (13 g) and Jhabua (7 g).

Consumption levels of all other food-stuffs in both the age groups in the three areas were less than the recommended levels (*Table I*).

It was observed that intake of nutrients was also lower than the recommended allowances in all the three areas (*Table II*). In Jhabua, children of both age groups were meeting only 35% of recommended intake of calories, while in other areas it was above 60%. With regard to protein, the intakes were more or less closer to RDA in Sarguja and Bastar and less in Jhabua. Thus, the intakes of both foods

TABLE I—Average Consumption of Foods (g) in the Three Districts

Age group (yrs)	Districts	Foodstuffs (g)						
		Cereals and millets	Pulses	GLV	Other vegetables, roots & tubers	Milk	Fats and oils	Sugar and jaggery
1-3	Sarguja	193	24	15	20	2	1	1
	Bastar	210	11	8	24	0	0	0
	Jhabua	113	5	5	6	5	0	1
	RDA (ICMR 1989)	175	35	40	30	300	150	30
4-6	Sarguja	351	38	17	38	6	2	1
	Bastar	308	15	12	25	0	7	1
	Jhabua	172	8	12	8	5	0	1
	RDA (ICMR 1989)	270	35	50	50	250	25	40

TABLE II—Average Intake of Nutrients in the Three Districts

Age group (yrs)	District	Nutrients								
		Calories (Kcal)	Protein (g)	Calcium (mg)	Iron (mg)	Vit. A ( $\mu$ g)	Ribo-flavin (mg)	Thiamine (mg)	Vit. C (mg)	Niacin (mg)
1-3	Sarguja	801	22	122	10.5	249	0.29	0.38	14.9	4.9
	Bastar	823	22	137	10.1	409	0.24	0.38	31.5	5.0
	Jhabua	422	16	59	5.1	170	0.17	0.50	6.2	2.6
	RDA (ICMR 1989)	1240	22	400	12.0	400	0.70	0.60	40.0	8.0
4-6	Sarguja	1421	37	181	17.1	287	0.48	0.56	20.2	8.0
	Bastar	1256	28	140	14.6	216	0.29	0.43	15.4	9.4
	Jhabua	633	22	82	7.8	244	0.24	0.76	10.4	3.8
	RDA (ICMR 1989)	1690	30	400	18.0	400	1.00	0.90	40.0	11.0

and nutrients appear to be lower in Jhabua compared to Bastar and Sarguja.

### Clinical Status

Clinically overt forms of Protein Energy Malnutrition and vitamin A deficiency signs were strikingly low compared to their rural counterparts(11). Marasmus and kwashiorkor, the extreme forms of PEM, were seen in Jhabua (1%) and Bastar(0.2%) and were absent in Sarguja. Angular stomatitis suggestive of B-complex deficiency was negligible in all the three areas viz., Jhabua (1.4%), Bastar (0.3%) and Sarguja (0.3%). Vitamin A deficiency sign,

Bitot spots was seen only in Jhabua (0.3%). However, about 4% of children in Sarguja exhibited signs of goitre, suggestive of iodine deficiency in the area.

### Nutritional Anthropometry

Average heights and weights of both boys and girls of the three areas were compared with their counterparts of rural Madhya Pradesh as well as with NCHS values (Table III). The tribal children were shorter and lighter than NCHS children. The mean heights and weights of children of Bastar and Jhabua were comparable to the rural Madhya Pradesh children. The

**TABLE III**—Mean  $\pm$  SD values of Heights (cm) and Weights (kg) of Tribal Preschool Children in Comparison with Rural Madhya Pradesh and NCHS

District	Age (years)	Boys			Girls		
		n	Height	Weight	n	Height	Weight
Sarguja	1+	23	73.3 $\pm$ 3.47	8.2 $\pm$ 1.05	44	71.2 $\pm$ 4.03	7.6 $\pm$ 1.48
	2+	42	79.7 $\pm$ 5.66	9.7 $\pm$ 1.65	31	79.9 $\pm$ 5.25	9.5 $\pm$ 1.48
	3+	53	88.9 $\pm$ 6.26	12.1 $\pm$ 1.90	63	86.1 $\pm$ 6.95	11.0 $\pm$ 1.78
	4+	57	94.0 $\pm$ 5.13	12.9 $\pm$ 1.96	40	95.6 $\pm$ 5.79	12.9 $\pm$ 1.97
Bastar	1+	87	71.3 $\pm$ 5.29	7.4 $\pm$ 1.29	74	70.1 $\pm$ 5.49	7.3 $\pm$ 1.28
	2+	84	78.2 $\pm$ 5.67	8.9 $\pm$ 1.54	99	78.5 $\pm$ 5.34	8.7 $\pm$ 1.42
	3+	110	86.4 $\pm$ 6.17	10.9 $\pm$ 1.55	80	86.2 $\pm$ 5.47	10.3 $\pm$ 1.54
	4+	91	93.4 $\pm$ 6.26	11.9 $\pm$ 1.57	104	93.3 $\pm$ 6.25	12.0 $\pm$ 1.97
Jhabua	1+	21	70.4 $\pm$ 3.82	8.0 $\pm$ 1.31	20	70.3 $\pm$ 3.75	8.3 $\pm$ 1.91
	2+	35	77.1 $\pm$ 4.01	8.9 $\pm$ 1.22	21	75.2 $\pm$ 4.95	8.9 $\pm$ 1.83
	3+	48	83.1 $\pm$ 4.91	10.6 $\pm$ 2.11	49	81.8 $\pm$ 5.87	9.6 $\pm$ 1.42
	4+	67	92.3 $\pm$ 6.81	13.1 $\pm$ 2.80	59	92.8 $\pm$ 5.42	12.7 $\pm$ 2.39
Rural Madhya Pradesh	1+		70.1	7.9		70.9	7.8
	2+		77.8	9.6		76.0	8.9
	3+		82.8	11.1		83.7	10.9
	4+		90.6	12.1		90.0	12.1
NCHS	1+		82.4	11.5		80.9	10.8
	2+		90.4	13.5		89.5	13.0
	3+		99.1	15.7		97.9	15.1
	4+		106.6	17.7		105.1	16.8

children of Sarguja tended to be taller and heavier than the rural preschool children of Madhya Pradesh.

The nutritional status of preschool children in terms of weight for age profile (*Table IV*) showed a higher proportion of children (42%) in normal and mild grades in Sarguja compared to Bastar (23.7%) and Jhabua (30%). In contrast the percentage of severely malnourished children was lowest in Sarguja (11.7%) followed by Bastar (23.5%) and Jhabua (26.0%). NNMB surveys (1975-79) in rural Madhya Pradesh indicated that 8.4% of preschoolers were 'normal' while 16.2% were severely growth retarded. This suggests that the

'nutritional' situation of children in Sarguja was better compared to those of Bastar and Jhabua.

The percentage of normal children by Waterlow's Classification (*Table V*), was high in Sarguja with 33.6%, while it is 27.1% in Bastar and only 17.3% in Jhabua. More stunting (59%) was observed among children of Jhabua. The proportion of children in 'stunted and wasted' grade was about 11% in Sarguja, followed by Bastar (18%) and Jhabua (19%).

### Discussion

The preschool children in Jhabua appear to be suffering from low dietary

**TABLE IV**—Percentage Distribution of Tribal Preschool Children by Gomez Classification

	No. surveyed	Gomez grades			
		Normal	Mild	Moderate	Severe
Sarguja <sup>a,d</sup>	351	7.1	35.3	45.9	11.7
Bastar <sup>b</sup>	731	2.1	21.6	52.8	23.5
Jhabua <sup>c</sup>	319	8.5	21.6	43.9	26.0
Rural Madhya Pradesh <sup>d</sup>	585	8.4	30.3	45.1	16.2

*Note:* Tests of significance was carried out by Chi-square test. Areas having one of the superscripts common are not statistically significant ( $p > 0.05$ ).

**TABLE V**—Percentage Distribution of Tribal Preschool Children by Waterlow's Classification

Districts	No. surveyed	Grades of malnutrition			
		Normal	Stunted	Wasted	Stunted & wasted
Sarguja <sup>a</sup>	351	33.6	50.1	4.8	11.4
Bastar <sup>b</sup>	727	27.1	47.6	7.2	18.2
Jhabua <sup>c</sup>	318	17.3	59.1	5.0	18.6

*Note:* Tests of significance was carried out by Chi-square test. Areas having one of the superscripts common are not statistically significant ( $p > 0.05$ ).

intake over a longer period. The food and nutrient consumption was low in the preschool children of all the districts. It was very low in Jhabua compared to other districts. Very few cases of overt PEM *viz.*, kwashiorkor and clinical marasmus were encountered during the survey. Growth retardation, the hall mark of PEM in young children, was encountered in all the three districts to varying degrees. Children of Sarguja fared better, with relatively lower proportion of undernourished children manifesting stunting (50%) and stunting and wasting (11.4%) compared to Bastar [stunting (48%) and stunted and wasted (25.4%)] and Jhabua [(stunting (59%) and stunted and wasted (18.6%)]. This speaks of unfavorable conditions under which these tribal groups lived.

The income from agriculture and labor, was relatively more stable resulting in better consumption levels which in turn led to better nutritional status of the population as evidenced among the preschoolers of Sarguja. The instable income from agriculture alone in Jhabua and poor forest resources in Bastar are mainly contributed to the higher levels of undernutrition in their two areas.

There is an imperative need to improve the socio-economic conditions and provision of health care facilities to effect considerable improvement in their nutrition and growth.

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